CLAIMS

1. A polymer electrolyte fuel cell, comprising a cell which comprises: at least,

a membrane electrode assembly comprising an anode comprising a catalyst layer, a cathode comprising a catalyst layer, and a polymer electrolyte membrane which is provided between the anode and the cathode and has hydrogen-ion conductivity; and

a pair of conductive separators which are arranged in such a manner as to hold the membrane electrode assembly between them and which has a first gas flow path having a fuel gas inlet for feeding fuel gas to the anode and a fuel gas outlet for discharging fuel gas from the anode formed on the main surface facing the anode and a second gas flow path having an oxidant gas inlet for feeding oxidant gas to the cathode and an oxidant gas outlet for discharging oxidant gas from the cathode formed on the main surface facing the cathode, characterized in that

the cell is arranged in such a manner that the direction normal to either of the main surface facing the anode and the main surface facing the cathode of the pair of separators intersects the gravity direction, the fuel gas inlet and the oxidant gas inlet are formed close to each other in the pair of separators, the first gas flow path is so formed that the fuel gas as a whole flows through the first gas flow path not against the gravity direction, but in the gravity direction,

and the second gas flow path is so formed that the oxidant gas as a whole flows through the second gas flow path not against the gravity direction, but in the gravity direction,

the main surface facing the anode of the polymer electrolyte membrane of the membrane electrode assembly has a first notched portion formed, where the catalyst layer is not formed, the main surface facing the cathode of the polymer electrolyte membrane of the membrane electrode assembly has a second notched portion formed, where the catalyst layer is not formed, and the first and second notched portions are formed in such positions that they are overlapped at least in part when viewed from the direction almost normal to either of the main surface facing the anode and the main surface facing the cathode of the polymer electrolyte membrane,

the first notched portion of the polymer electrolyte membrane has a first reinforcement member arranged having gas permeability,

the second notched portion of the polymer electrolyte membrane has a second reinforcement member arranged having gas permeability, and

the polymer electrolyte membrane is supported in the first and second notched portions in such a manner that the polymer electrolyte membrane is held between the first reinforcement member and the second reinforcement member.

2. The polymer electrolyte fuel cell according to claim 1, characterized in that the cell is arranged in such a

manner that the direction normal to either of the surface facing the anode and the surface facing the cathode of the pair of separators intersects almost perpendicular to the gravity direction.

3. The polymer electrolyte fuel cell according to claim 1, characterized in that the position is the upstream portion of the first flow path and the second flow path and the first gas flow path and the second gas flow path are provided in such a manner as to be parallel to each other.

4. The polymer electrolyte fuel cell according to claim 1, characterized in that the position is the midstream portion of the first flow path and the second flow path and the first gas flow path and the second gas flow path are provided in such a manner as to be parallel to each other.

5. The polymer electrolyte fuel cell according to claim 1, characterized in that the anode and the cathode each have a gas diffusion layer provided outside the catalyst layers, and

the first reinforcement member and the second reinforcement member are made of part of the gas diffusion layers.

6. The polymer electrolyte fuel cell according to claim 1, characterized in that the ratio of the first notched portion to the total area of the first gas flow path and the ratio of the second notched portion to the total area of the second gas flow path are 5 to 50%, respectively.